

# DRAWING AMENDMENTS

Please replace the objected to Figures 1 and 4 with the following Replacement Figures 1 and 4.

**BEST AVAILABLE COPY**

REMARKS

Claims 1-9 were presented for examination on 10/11/2005.

The Office Action mailed 12/27/2005 states that:

(a) The replacement drawings received 10/11/2005 were objected to for the reasons stated in Sections 3 and 4 of the Office Action of 6/14/2005 and for introducing "new matter". See Section 1 beginning on Page 2 of the Office Action.

(b) The specification was objected to under 35 USC 112, first paragraph, and Claims 1-6 and 9 were rejected under 35 USC 112, first paragraph, for the stated reason that the specification fails to provide an adequate written description of the invention and fails to adequately teach how to make and/or use the invention, i.e., failing to provide an enabling disclosure for the reasons set forth in section 6 of the Office Action mailed 6/14/2005 (specifically, the portions of the disclosure relating to the support springs and the seismic support structure). See Section 3 beginning on Page 4 of the Office Action.

(c) The specification was objected to under 35 USC 112, first paragraph, and Claims 1-6 and 9 were rejected under 35 USC 112, first paragraph, for the stated reason that the specification fails to provide an enabling disclosure (and specifically the claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to make and/or use the invention for the reasons set forth in Section 3). See Section 4 beginning on Page 6 of the Office Action.

(d) Claims 1-6 and 9 were rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as their invention. See Section 5 beginning on Page 6 of the Office Action.

(e) Claims 1, 4-6 and 9 were rejected under 35 USC 103(a) as being unpatentable over US Patent No. 4,678,623 (Malandra et al.) for the reasons set forth in Section 13 of the 6/14/2005 Office Action. See Section 6 beginning on Page 7 of the Office Action.

(f) Claims 1, 4-5 and 9 were rejected under 35 USC 103(a) as being unpatentable over US Patent Application Publication No. 2003/0026377 A1 (Baliga et al.) in view of Malandra et al. and further in view of US Patent No. 4,302,290 (Mazur et al.). See Section 7 beginning on Page 8 of the Office Action.

(g) Claims 1, 4-5 and 9 were rejected under 35 USC 103(a) as being unpatentable over "Integrated Head Assembly for Korean Next Generation Reactor" by Kim et al. alone or in the alternative over either Malandra et al. or Mazur et al. See Section 8 beginning on Page 13 of the Office Action.

(i) The Applicants were required under 37 CFR 1.105 to provide the entire article by Kim et al. including the figures which appear to be on pages X1-321. See Section 9 beginning on Page 14 of the Office Action.

Original Claims 1 and 6, amended Claim 5 and new Claims 10-13 are presented for reconsideration. Claims 2-4 and 9 have been canceled. Claims 7 and 8 have been withdrawn from active consideration. New Replacement Drawing Figures 1 and 4 are provisionally submitted. The Applicants respectfully submit in view of the above amendments and below remarks that the drawings are unobjectionable and the description and the claims satisfy the requirements of the patent statute. Accordingly, allowance of these claims is respectfully solicited.

Re: The Drawing Objection

In response to the Examiner's request, the Applicants have submitted replacement Figures 1 and 4. These drawing figures have been amended at two locations in accordance with the Examiner's request to remove one depiction of a "spring 74" from the lower end of each of the two illustrated internal ducts 52. The accompanying drawings illustrate the structure literally described at lines 10-12 of Page 5 of the specification. The Applicants respectfully submit that the accompanying drawings to not present "new matter".

A marked-up copy of the current version of Figures 1 and 4 indicating the changes is attached to this Reply as Appendix A.

Re: The Kim et al. Paper

In response to the Examiner's request, the Applicants provide herewith a full copy of the Kim et al. paper entitled "Integrated Head Assembly for Korean Next Generation Reactor" that was presented at the 15<sup>th</sup> International Conference on Structural Mechanics in Reactor Technology in Seoul, Korea on August 15-20, 1999. The Applicants note that this copy includes the four drawing figures discussed in the text of the paper.

Background

The Applicants' invention relates to an improved integrated head assembly. An integrated head assembly generally includes a reactor pressure vessel closure head and appurtenant structures supported on the head during on-line operations, including an array of CRDMs and a seismic support platform, all of which can be moved on and off the reactor pressure vessel as a unitary structure during an outage.

Prior art (and the Applicants') seismic support platforms are designed to support CRDMs against seismic loads while facilitating vertical movement of the CRDMs during seismic events such as earthquakes; i.e., seismic support platforms restrain the horizontal movement of CRDMs. Seismic loads are generally horizontal forces that tend to shake the CRDMs (and other structures). Such loads might cause the upper ends of control rod drive mechanisms to deflect relative to their lower ends such that the CRDMs might not drop the control rods in the reactor pressure vessels to shutdown the reactor in the predetermined time during an earthquake. Seismic support assemblies are not designed support the weight of the CRDMs. Thus, for example, the Malandra et al. Patent (US Patent No. 4,678,623) states at Column 6, lines 20-29, that:

"A seismic support platform 128, which is in the form of an annular, plate-type disc, is fixedly secured within the peripheral region thereof to upper regions of the three vertically extending lift rods 144. As is well know, a seismic support platform provides lateral restraint for the CRDM assemblies 116 so as to prevent swaying or deflections thereof under, for example, seismic conditions, and tie rods, not shown, are secured between the seismic support platform 128 and the facility containment building walls."

The Baliga et al. (Patent Application Publication No. 2003/0026377) states in Paragraph 0058 on Page 5:

"A seismic support system 300 for the integrated head assembly 100 is shown in Fig. 12. The seismic support system 300 is designed to support the CRDMs 96 in a seismic event to ensure that the control rods are able to drop down into the reactor if it is necessary to shut the reactor down."

Similarly, the Kim et al. paper states on page 317:

**"CEDM Seismic Support**

The function of the CEDM seismic support is to restrain each CEDM from having excessive deformation at the top of the CEDM in the horizontal direction during an earthquake event. The CEDM seismic support will transfer seismic loads from 101 CEDMs to the supporting columns of the cooling shroud and then to the seismic restraints that are connected to the refueling walls on both sides of the [Integrated Head Assembly (Figure 2). The CEDM seismic support is fabricated using carbon steel plates."

The "seismic restraints" (which are equivalent to the Malandra et al. Patent's "tie rods") are illustrated in Figures 1 and 2 of the Kim et al. paper.

**Re: The 35 USC 112, First Paragraph, Rejections**

The Applicants respectfully request that the Examiner reconsider the stated position that the as-filed specification does not provide an adequate written description or an enabling disclosure. It is respectfully submitted that engineers who design integrated head assemblies and their component parts can be expected to design the head assemblies disclosed by the specification and shown in the drawings by applying their knowledge of the mechanical arts, skills and training.

The patent literature shows that designers in the mechanical arts have engineered the details of sheet metal springs in harsh environments such as the atmosphere surrounding the CRDMs. For example, US Patent Nos. 5,265,138 (to DeMario et al.) and 4,923,669 (to DeMario et al.) illustrate the use of narrow strips cut from metal sheet to function as springs within nuclear reactor pressure vessels. Such springs operate against the hydraulic forces of highly turbulent water circulating at process temperatures of up to about 560°F.

Similarly, the above-discussed Malandra et al. Patent and the above-discussed Baliga et al. Patent Application Publication illustrate the structures of seismic support assemblies for transmitting seismic loads during earthquakes to limit the deflection of the upper ends of the control rod drive mechanisms relative to the lower ends extending in the reactor vessel nozzles.

The Malandra et al. Patent also suggests that designers in the mechanical arts can be expected to be able to fasten (e.g., by welding) plate/cruciform members to a duct, e.g., at one of the confronting ends of adjacent duct segments for ultimate positioning at a specific dimension along the length of the duct (such as the distance between the bottom of the fan plenum and the seismic support plate).

Re: The 35 USC 112, Second Paragraph, Rejections

The Applicants respectfully request that the Examiner reconsider the rejections of Claims 1 and 5 in view of the above discussion of the function of seismic support assemblies. As is discussed above, ordinarily skilled designers employ seismic supports to restrain the lateral movement of CRDMs during earthquakes and like events. Seismic support assemblies are not designed support the weight of the CRDMs.

The Applicants respectfully submit that the version of Claims 1 and 5 presently under consideration satisfy the requirements of 35 USC 112. It is also submitted that the rejections of Claims 2-4 and 9 are moot in view of the cancellation of these claims.

Re: The 35 USC 103 Rejections

The Examiner correctly points out that the prior art of record does not disclose integrated head assemblies having internal ducts. However, the Examiner stated the position that it would have been obvious to modify the structures disclosed by the Malandra et al. Patent and other prior

NSD 2003-006 12

art integrated head assemblies to provide the head assembly of Claims 1, 5 and 6. The Examiner pointed out that the Malandra et al. Patent teaches that it is "quite important" to locate the cooling system components within the "envelope of the closure head". The Examiner concluded that it would have been obvious to provide internal ducts in order to provide additional space (i.e., additional to the space within the "envelope of the closure head") around the head assembly.

The Applicants respectfully submit that the Malandra et al., the Baliga et al. and the Mazur et al. patent documents and the Kim et al. separately or in any combination do not disclose or suggest integrated head assemblies having internal ducts. There is no support in the record for the Examiner's stated view that skilled designers would have employed internal ducts merely to obtain greater clearances for less than the entire periphery of the head assembly. The clearance around the head assembly is essentially determined by the seismic support platform and the three or more tie rods (Reference Numeral 88 on Figure 1). The prior art of record indicates that the space above the closure studs extending above the flange of the reactor pressure vessel closure head is unobstructed. See, e.g., Figure 2 of the Malandra et al. Patent and Figure 4 of the Kim et al. paper. Also, there is no support in the record for the Examiner's stated view that skilled designers would have employed internal ducts to provide access to peripheral CRDMs. The Baliga et al. patent application publication indicates that designers would employ access doors such as doors 226 discussed at Paragraph 51 and shown by Figure 5 to access the peripheral CRDMs.

Claim 1 specifically states that the internal ducts are within the array of CRDMs and extend from below the upper end of the lower shroud (which surrounds the CRDMs heat-generating electro-magnetic coils) up to an upper (fan) plenum located above a seismic support platform. In this arrangement, the ducts extend between the electro-magnetic coils and baffle the air flow through the coils.



Claim 5 describes an embodiment of the Applicants' improved head assembly illustrated by Figure 1 wherein the seismic support platform limits the lateral movement of the internal ducts in addition to supporting the CRDMs against seismic loads and the portions of the ducts within the seismic support platform have internal plates (cruciform). Claim 5 has been amended to replace the functional statement that the internal ducts are "seismically supported by" the seismic support platform with the statement that the internal ducts "extend within the array of CRDMs through" the seismic support platform. This structure is shown by Figure 1.

Claim 6 describes an embodiment of the head assembly of Claim 1 wherein the internal ducts are supported by the fan plenum. The specification discloses at page 5, lines 7-20, a preferred embodiment wherein the fan (upper) plenum supports the internal ducts by bolts. Claim 6 has been amended to further point out that each lift leg comprises an upper leg member attached by a clevis assembly to a lower leg member with the upper plenum supported by the upper leg member and the seismic support platform supported by the lower leg member. This structure is discussed in the paragraph bridging pages 5 and 6 of the specification. In this arrangement, the entire cooling system (including internal ducts) can be readily removed to a remote location in one movement to leave the CRDMs fully exposed for inspection and servicing.

New Claim 10 describes an embodiment of the head assembly of Claim 1 wherein the internal ducts are a backfit into an existing head assembly. This feature is discussed in the specification at Page 2, lines 6-7.

New Claim 11 describes an embodiment of the Applicants' head assembly wherein the lower ends (Reference Number 70 in Figure 1) of the internal ducts extend into a CRDM plenum (Reference Number 62 in Figure 1), which is under the electro-magnetic coil assemblies. This feature is shown by Figure 1 and Figure 4. In this arrangement, the ducts and radially spaced lower shroud function together as a guide for the cooling air flowing past the electro-magnetic coils into the CRDM plenum.

New Claim 12 describes an embodiment of the head assembly of Claim 11 wherein the internal ducts are L shaped. This feature is discussed in the specification at Page 5, lines 9-10.

New Claim 13 describes an embodiment of the head assembly of Claim 11 wherein the internal ducts have a rectangular shape. This feature is discussed in the specification at Page 5, lines 9-10.

Conclusion

Accordingly, the Applicants respectfully submit that the prior art of record considered alone or in any combination does not disclose or suggest the improved integrated head assemblies of Claims 1, 5, 6 and 10-13.

Allowance of these claims is earnestly solicited.

The Commissioner is authorized to charge any additional fees required by 37 CFR 1.16 or 37 CFR 1.17 as a result of this Reply to Deposit Account No. 50-0947.

Respectfully submitted,



Attorney for Applicants

Tele: (412) 374-3970

Facsimile No. 412-374-3832

Date: 3/9/2006

J.C. Valentine:pl  
Reg. No. 27,239

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

☐ **BLACK BORDERS**

☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**

☐ **FADED TEXT OR DRAWING**

☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**

☐ **SKEWED/SLANTED IMAGES**

☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**

☐ **GRAY SCALE DOCUMENTS**

☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**

☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**

☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**